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Bert Vogelstein

Geneticist Bert Vogelstein Receives \$500,000 Gruber Genetics Prize for Discoveries of New Genetic Pathways and Processes Contributing to Cancer

May 9, 2019, New Haven, CT – The 2019 Gruber Genetics Prize will be awarded to Bert Vogelstein, a titan in the field of cancer genetics, for discoveries of new genetic pathways and processes contributing to cancer. Vogelstein is a Professor at the Sidney Kimmel Comprehensive Cancer Center at Johns Hopkins and an Investigator of The Howard Hughes Medical Institute. The work from his laboratory has advanced our understanding of cancer pathogenesis and led to the development of new diagnostic tests and targeted therapies for cancer.

The prize, which includes a \$500,000 unrestricted cash award, will be presented to Vogelstein on October 18 at the annual meeting of the American Society of Human Genetics in Houston, Texas.

“Bert Vogelstein has made major contributions to our understanding of the cancer genome,” says Helen Hobbs, professor, University of Texas Southwestern and chair of the Selection Advisory Board to the Prize “He has had a profound impact on strategies for cancer prevention and treatment.” Vogelstein’s group has discovered key facts that are now taken for granted, such as the idea that cancer results from a series of mutations arising in a single founder cell. In addition to generating these major conceptual insights, Vogelstein’s lab has also identified several of the genetic alterations that lead cells to turn cancerous when mutated, including those in *TP53*, which is the most commonly mutated gene across human cancers. The group’s discoveries of cancer-linked genes have not only improved our understanding of how cancer occurs and progresses but also enabled the development of targeted anti-cancer drugs, such as those targeting mutations in isocitrate dehydrogenase and phosphoinositide 3-kinase genes. One of his group’s most recent discoveries was that cancers with defects in mismatch repair genes are particularly susceptible to immune checkpoint discoveries. This led to the first FDA approval for a “tumor agnostic” therapy, i.e., a therapy approved not for a specific cancer type but rather approved for any cancer type simply on the basis of its genetic constitution.

Vogelstein has also been a pioneer in the realm of early cancer detection. In 1992, his group reported that body fluids of patients with cancer contain DNA with mutations in those cancers. This led to the first FDA-approved non-invasive screening test for cancer based on genetic alterations. It also established a way of checking for cancers by testing bodily fluids rather than surgically sampling a tumor, enabling detection while a cancer is less advanced and thus easier to treat. He and his long-time

colleague Kenneth W. Kinzler developed key technologies used for the detection of rare mutations in DNA samples, beginning with their description of "digital PCR", a method for counting DNA molecules one at a time. Their group later showed that the methodology can be used to monitor how tumors respond to treatments over time.

Much of the current work in cancer diagnostics and therapeutics is based on the foundational research in Vogelstein's lab. "Prior to Dr. Vogelstein's work it was believed that solid tumors, which are responsible for most cancer deaths, were simply too complicated to be studied with the modern molecular techniques that were increasingly being used to understand liquid tumors such as leukemias and lymphomas. Dr. Vogelstein's pioneering work shattered this view and led to new cancer treatments and diagnostic tests informed by the molecular underpinnings of various solid tumors," says William Kaelin, Professor, Dana-Farber Cancer Institute, Harvard Medical School, and Associate Director, Basic Science, Dana-Farber/Harvard Cancer Center.

Additional Information

In addition to the cash award, each recipient will receive a gold laureate pin and a citation that reads:

The Gruber Foundation proudly presents the 2019 Genetics Prize to Bert Vogelstein for his discoveries of new genetic pathways and processes contributing to cancer. He showed that malignant transformation of colorectal cancers results from the stepwise acquisition of mutations in oncogenes and tumor suppressor genes, thus elucidating the somatic evolution of cancer. Using cutting edge technologies and approaches, he identified new genetic defects that alter cell signaling, promote cell growth, and compromise the integrity of DNA repair. His work has advanced our understanding of cancer pathogenesis and led to the development of new diagnostic tests and targeted therapies for cancer.

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Laureates of the Gruber Genetics Prize:

- **2018: Joanne Chory and Elliot Meyerowitz**, for helping revolutionize plant molecular biology, with implications for agriculture, the environment, and human health and disease
- **2017: Stephen Elledge**, for discovering and characterizing the molecular mechanisms of the DNA damage response pathway in eukaryotic cells
- **2016: Michael Grunstein and David Allis**, for the discovery of the role of histone proteins and their covalent modification in the regulation of eukaryotic gene expression
- **2015: Emmanuelle Charpentier and Jennifer Doudna**, for establishing a framework for universal genome editing
- **2014: Victor Ambros, David Baulcombe, and Gary Ruvkun**, for pioneering the study of small non-coding RNA's, molecules recognized as playing a critical role in regulating gene expression
- **2013: Svante Pääbo**, for pioneering the analysis of ancient DNA
- **2012: Douglas C. Wallace**, for his groundbreaking contributions to mitochondrial genetics
- **2011: Ronald Davis**, for pioneering development and application of recombinant-DNA techniques
- **2010: Gerald Fink**, whose work in yeast genetics advanced the field of molecular genetics
- **2009: Janet Davison Rowley**, for her seminal discoveries in molecular oncology
- **2008: Allan C. Spradling**, for his work on fly genomics
- **2007: Maynard V. Olson**, for his contributions to genome science
- **2006: Elizabeth H. Blackburn**, for studies of telomeres and telomerase, and science advocacy

- **2005: Robert H. Waterston**, for his pivotal role in the Human Genome Project
- **2004: Mary-Claire King**, for three major findings in modern genetics: the similarity of the human and chimpanzee genomes, finding a gene that predisposes to breast cancer, and forensic genetics.
- **2003: David Botstein**, a driving force in modern genetics who established the ground rules for human genetic mapping
- **2002: H. Robert Horvitz**, who defined genetic pathways responsible for programmed cell death
- **2001: Rudolf Jaenisch**, who created the first transgenic mouse to study human disease

The Prize recipients are chosen by the Genetics Selection Advisory Board. Its members are:

Victor Ambros, University of Massachusetts Medical School; **Kathryn Anderson**, Sloan Kettering Institute; **Utpal Banerjee**, University of California Los Angeles; **Marlene Belfort**, University at Albany, SUNY; **Kay Davies**, University of Oxford; **Helen Hobbs**, University of Texas Southwestern (Chair); **James Lupski**, Baylor College of Medicine.

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By agreement made in the spring of 2011 The Gruber Foundation has now been established at Yale University.

The Gruber International Prize Program honors individuals in the fields of Cosmology, Genetics and Neuroscience, whose groundbreaking work provides new models that inspire and enable fundamental shifts in knowledge and culture. The Selection Advisory Boards choose individuals whose contributions in their respective fields advance our knowledge and potentially have a profound impact on our lives.

The Genetics Prize is presented to a leading scientist, or up to three, in recognition of groundbreaking contributions to any realm of genetics research.

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For more information on the Gruber Prizes, visit www.gruber.yale.edu, e-mail info@gruber.yale.edu or contact A. Sarah Hreha at +1 (203) 432-6231. By mail: The Gruber Foundation, Yale University, Office of Development, PO Box 2038, New Haven, CT 06521.

Media materials and additional background information on the Gruber Prizes can be found at our online newsroom: <https://gruber.yale.edu/news-media>

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